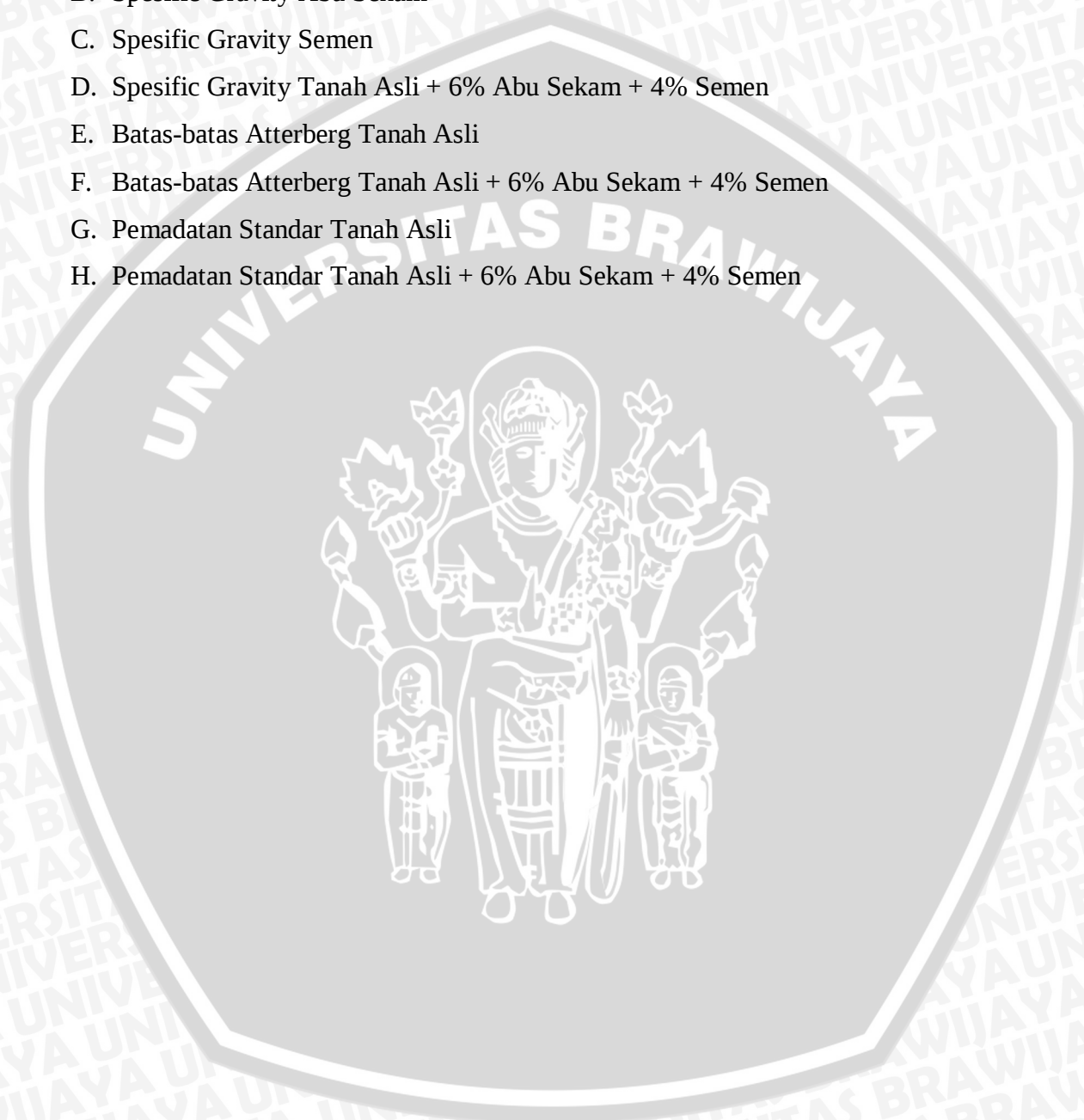


LAMPIRAN 4

UJI KARAKTERISTIK TANAH

- A. Spesific Gravity Tanah Asli
- B. Spesific Gravity Abu Sekam
- C. Spesific Gravity Semen
- D. Spesific Gravity Tanah Asli + 6% Abu Sekam + 4% Semen
- E. Batas-batas Atterberg Tanah Asli
- F. Batas-batas Atterberg Tanah Asli + 6% Abu Sekam + 4% Semen
- G. Pemadatan Standar Tanah Asli
- H. Pemadatan Standar Tanah Asli + 6% Abu Sekam + 4% Semen

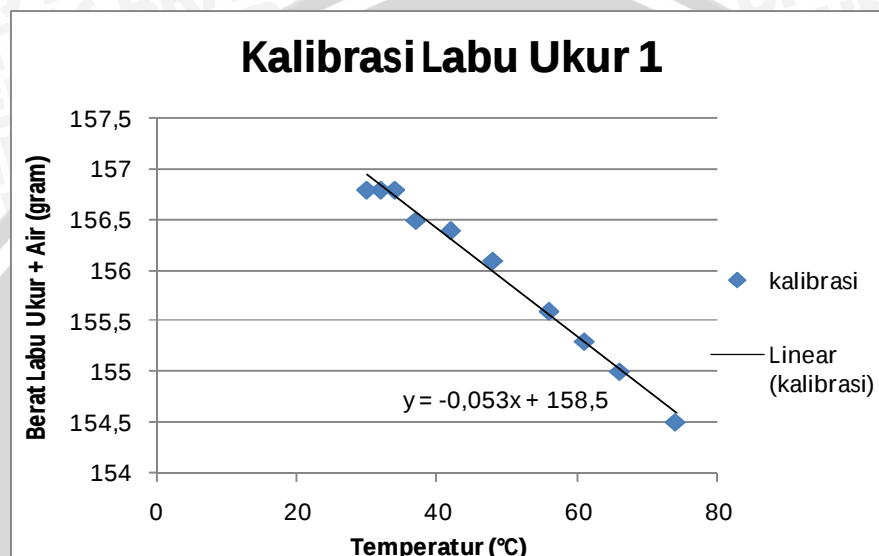


PEMERIKSAAN BERAT JENIS

Kalibrasi Labu Ukur

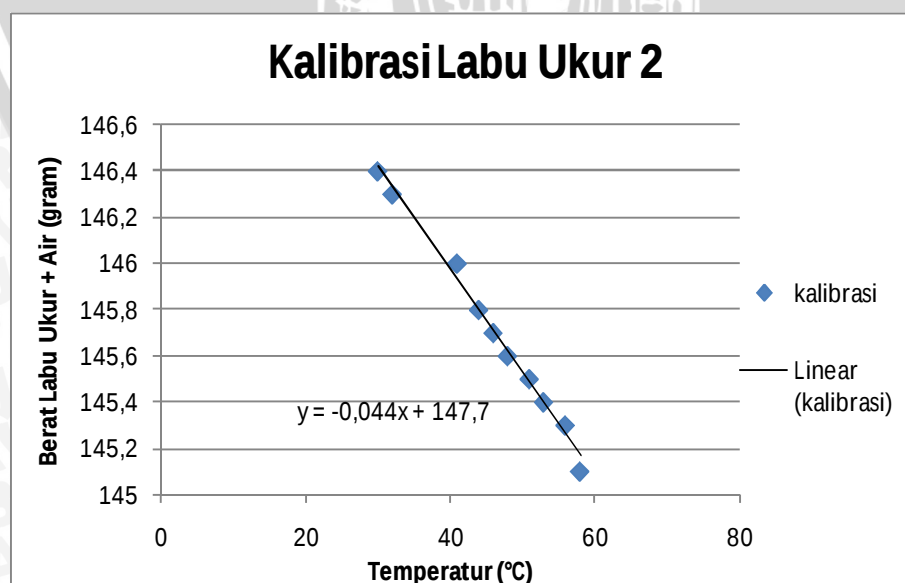
LABU UKUR 1

No. Pemeriksaan	1	2	3	4	5	6	7	8	9	10
Temperatur (°C)	74	66	61	56	48	42	37	34	32	30
Berat Labu Ukur + Air (gram)	154,5	155	155,3	155,6	156,1	156,4	156,5	156,8	156,8	156,8



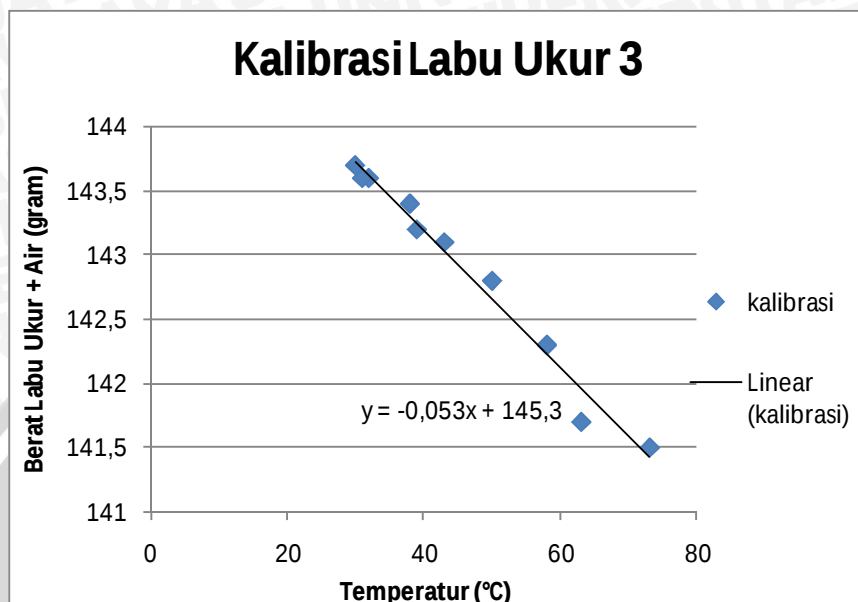
LABU UKUR 2

No. Pemeriksaan	1	2	3	4	5	6	7	8	9	10
Temperatur (°C)	58	56	53	51	48	46	44	41	32	30
Berat Labu Ukur + Air (gram)	145,1	145,3	145,4	145,5	145,6	145,7	145,8	146	146,3	146,4



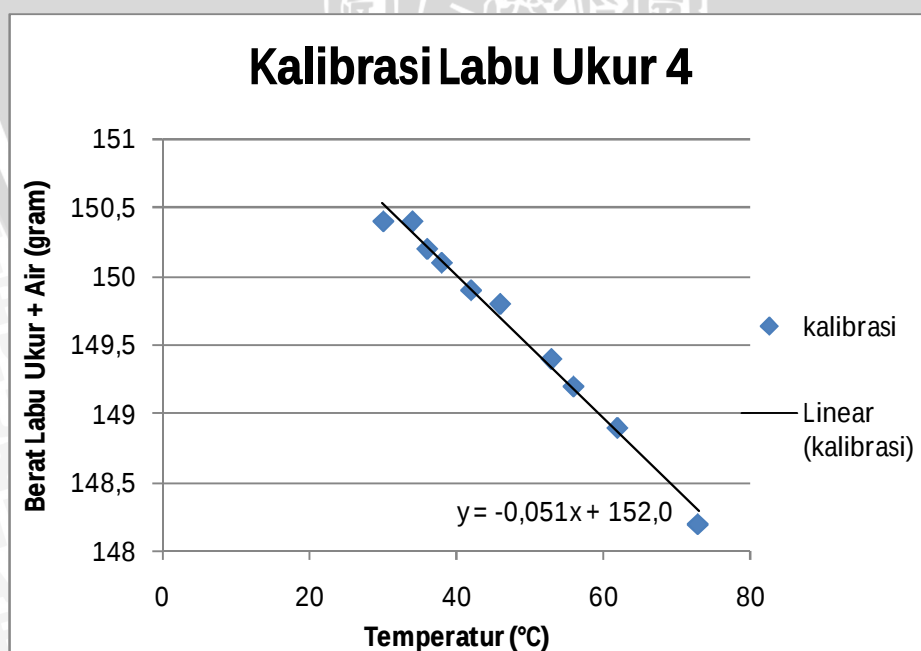
LABU UKUR 3

No. Pemeriksaan	1	2	3	4	5	6	7	8	9	10
Temperatur (°C)	73	63	58	50	43	39	38	32	31	30
Berat Labu Ukur + Air (gram)	141,5	141,7	142,3	142,8	143,1	143,2	143,4	143,6	143,6	143,7



LABU UKUR 4

No. Pemeriksaan	1	2	3	4	5	6	7	8	9	10
Temperatur (°C)	73	62	56	53	46	42	38	36	34	30
Berat Labu Ukur + Air (gram)	148,2	148,9	149,2	149,4	149,8	149,9	150,1	150,2	150,4	150,4



Percobaan III

Labu Ukur		4									
Berat Labu Ukur	gram	43.9									
Berat Tanah Kering (Ws)	gram	20									
Berat Labu Ukur + Air + Tanah (W1)	gram	155	155.4	155.6	155.7	156.1	156.3	156.4	156.6	156.7	157
Suhu	gram	65	63	57	53	48	45	41	37	35	30
Berat Labu Ukur + Air (W2)	(°C)	144.87	144.96	145.22	145.40	145.62	145.76	145.93	146.11	146.20	146.42
Spesific Gravity		2.03	2.09	2.08	2.06	2.10	2.11	2.10	2.10	2.11	2.12
Rata-rata Spesific Gravity		2.09									

Rata-rata Spesific Gravity Abu Sekam = 2,10

C. Spesific Gravity Semen

Percobaan I

Labu Ukur		1									
Berat Labu Ukur	gram	58.2									
Berat Tanah Kering (Ws)	gram	20									
Berat Labu Ukur + Air + Tanah (W1)	gram	166.4	166.7	166.9	167.3	167.5	167.7	167.9	168.4	168.7	168.9
Suhu	gram	72	66	58	55	49	44	41	39	33	30
Berat Labu Ukur + Air (W2)	(°C)	154.70	155.02	155.44	155.60	155.92	156.19	156.35	156.46	156.78	156.94
Spesific gravity		2.4110	2.4051	2.3412	2.4088	2.3743	2.3556	2.3667	2.4822	2.4759	2.4882
Rata-rata Spesific gravity		2.41									

Percobaan II

Labu Ukur		3									
Berat Labu Ukur	gram	43.9									
Berat Tanah Kering (Ws)	gram	20									
Berat Labu Ukur + Air + Tanah (W1)	gram	156.4	156.5	156.8	156.9	157.4	157.7	158	158.4	157.6	157.7
Suhu	gram	65	63	57	53	48	45	41	37	35	30
Berat Labu Ukur + Air (W2)	(°C)	144.86	144.95	145.22	145.40	145.62	145.75	145.93	146.11	146.20	146.42
Spesific gravity		2.3629	2.3661	2.3755	2.3538	2.4334	2.4839	2.5222	2.5950	2.3267	2.2941
Rata-rata Spesific gravity		2.4114									

Percobaan III

Labu Ukur		4									
Berat Labu Ukur	gram	51.6									
Berat Tanah Kering (Ws)	gram	20									
Berat Labu Ukur + Air + Tanah (W1)	gram	159.6	160.5	160.8	160.9	161.2	161.3	161.4	161.6	161.7	162.1
Suhu	gram	84	73	65	60	48	40	36	34	32	30
Berat Labu Ukur + Air (W2)	(°C)	147.73	148.30	148.72	148.98	149.60	150.01	150.22	150.33	150.43	150.53
Spesific gravity		2.4599	2.5637	2.5264	2.4765	2.3813	2.2952	2.2672	2.2922	2.2912	2.3716
Rata-rata Spesific gravity		2.3925									

Rata-rata Spesific Gravity Semen = 2,40

D. Spesific Gravity Tanah Asli + 6% Abu Sekam + 4% Semen

Percobaan I

Uraian	Satuan	Perhitungan					
Labu Ukur	-	1					
Berat Labu Ukur	gram	58.20					
Berat Tanah Kering (Ws)	gram	20					
Berat Labu Ukur + Air + Tanah (W1)	gram	167.70	168.20	168.60	168.80	168.90	169.00
Suhu	(°C)	55	51	44	35	33	30
Berat Labu Ukur + Air (W2)	gram	155.60	155.82	156.19	156.67	156.78	156.94
Specific Grafity (Gs)	-	2.53	2.63	2.63	2.54	2.54	2.52
Rata-rata Specific Grafity	-	2.57					

Percobaan II

Uraian	Satuan	Perhitungan					
Labu Ukur	-	3					
Berat Labu Ukur	gram	43.90					
Berat Tanah Kering (Ws)	gram	20					
Berat Labu Ukur + Air + Tanah (W1)	gram	154.50	154.60	154.80	155.00	155.20	155.30
Suhu	(°C)	63	55	46	37	34	30
Berat Labu Ukur + Air (W2)	gram	141.96	142.39	142.87	143.35	143.51	143.73
Specific Grafity (Gs)	-	2.68	2.57	2.48	2.40	2.41	2.37
Rata-rata Specific Grafity	-	2.48					

Percobaan III

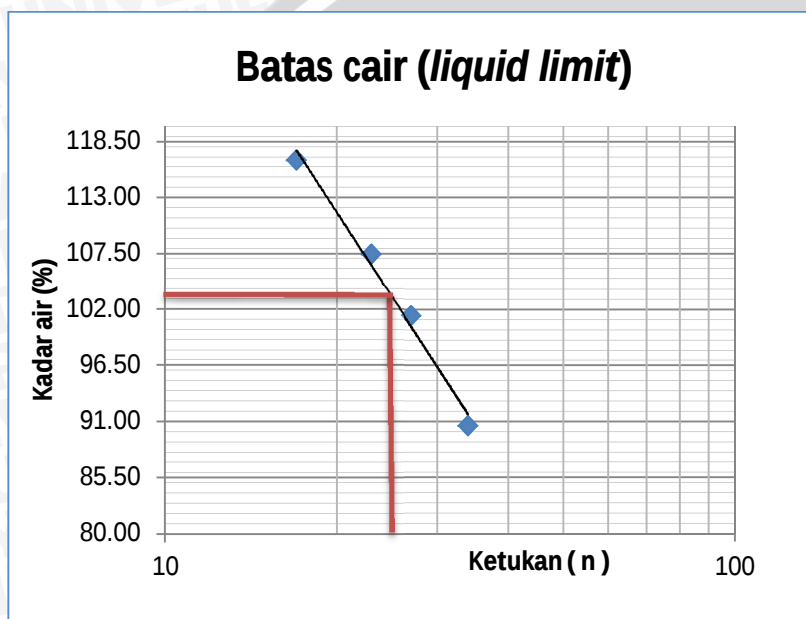
Uraian	Satuan	Perhitungan					
Labu Ukur	-	4					
Berat Labu Ukur	gram	50.80					
Berat Tanah Kering (Ws)	gram	20					
Berat Labu Ukur + Air + Tanah (W1)	gram	160.80	161.30	161.60	161.90	162.20	162.40
Suhu	(°C)	62	55	44	38	35	30
Berat Labu Ukur + Air (W2)	gram	148.87	149.24	149.81	150.12	150.27	150.53
Specific Grafity (Gs)	-	2.48	2.52	2.44	2.43	2.48	2.46
Rata-rata Specific Grafity	-	2.47					

Rata-rata Spesific Gravity Tanah + 6% Abu Sekam + 4% Semen = 2,51

E. Batas-batas Atterberg Tanah Asli

Batas Cair (*Liquid Limit*)

Cawan no.	I	II	III	IV
Berat tanah basah + cawan (gr)	21.3	22.8	20.7	19.7
Berat tanah kering + cawan (gr)	12.9	14.1	13.2	13
Berat cawan (gr)	5.7	6	5.8	5.6
Berat tanah kering (gr)	7.2	8.1	7.4	7.4
Berat air (gr)	8.4	8.7	7.5	6.7
Kadar air (%)	116.67	107.41	101.35	90.54
Jumlah ketukan (n)	17	23	27	34



Batas Plastis (*Plastic Limit*)

Cawan no.	I	II	III	IV
Berat tanah basah + cawan (gr)	10.9	12.6	12.8	13.4
Berat tanah kering + cawan (gr)	8.7	10.5	10.7	11.2
Berat cawan (gr)	4.3	6.1	5.7	5.4
Berat tanah kering (gr)	4.4	4.4	5	5.8
Berat air (gr)	2.2	2.1	2.1	2.2
Kadar air (%)	50.00	47.73	42.00	37.93
Rata - rata kadar air (%)	44.41			

$$\begin{aligned} \text{Indeks Platisitas (IP)} &= 103.5\% - 44.41\% \\ &= 59.09\% \end{aligned}$$

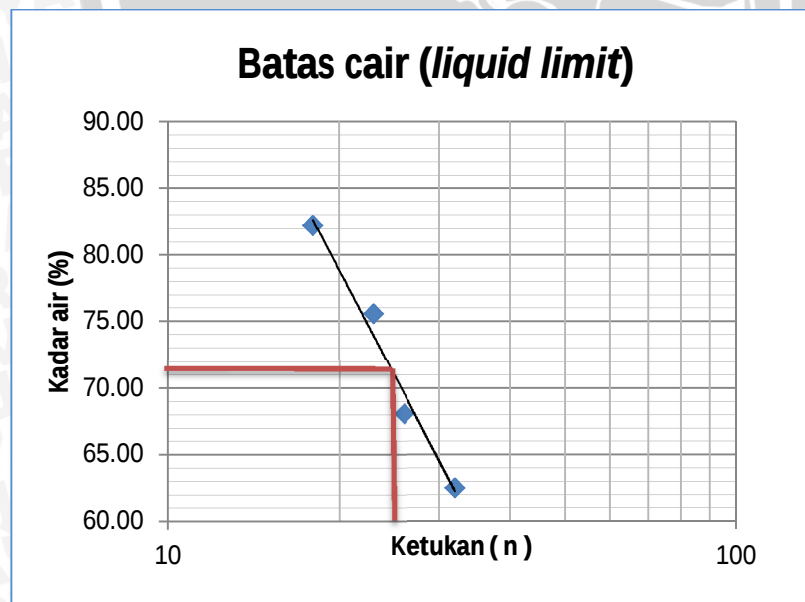
Batas Susut (*Shrinkage Limit*)

BATAS SUSUT (SL)		
Nomor Cetakan	1	
Berat Cetakan	gr	19.2
Berat Cawan + Tanah Basah	gr	58.2
Berat Cawan + Tanah Kering	gr	44.0
Berat Tanah Basah (m_1)	gr	39.0
Berat Air	gr	14.2
Berat Tanah Kering (m_2)	gr	24.8
Volume Tanah Basah (V)	ml	25.5
Volume Tanah Kering (V_s)	ml	12.0
Kadar Air (Wc)	%	57.3
$SL = (Wc - ((V - V_s)/m_2)) * 100\%$	%	2.8

F. Batas-batas Atterberg Tanah Asli + 6% Abu Sekam + 4% Semen

Batas Cair (*Liquid Limit*)

Cawan no.	I	II	III	IV
Berat tanah basah + cawan (gr)	13.6	12.9	13.5	14.7
Berat tanah kering + cawan (gr)	9.9	9.8	10.3	11.2
Berat cawan (gr)	5.4	5.7	5.6	5.6
Berat tanah kering (gr)	4.5	4.1	4.7	5.6
Berat air (gr)	3.7	3.1	3.2	3.5
Kadar air (%)	82.22	75.61	68.09	62.50
Jumlah ketukan (n)	18	23	26	32



Batas Plastis (*Plastic Limit*)

Cawan no.	I	II	III	IV
Berat tanah basah + cawan (gr)	11.7	13.3	11.9	13.4
Berat tanah kering + cawan (gr)	9.6	11.1	9.4	11.9
Berat cawan (gr)	4	5.7	4.1	5.4
Berat tanah kering (gr)	5.6	5.4	5.3	6.5
Berat air (gr)	2.1	2.2	2.5	1.5
Kadar air (%)	37.50	40.74	47.17	23.08
Rata - rata kadar air (%)	37.12			

Indeks Platisitas (IP) = 71.5% - 37.12%

= 34.38%

Batas Susut (*Shrinkage Limit*)

BATAS SUSUT (SL)		
Nomor Cetakan	1	
Berat Cetakan	gr	30.2
Berat Cawan + Tanah Basah	gr	52.3
Berat Cawan + Tanah Kering	gr	44.0
Berat Tanah Basah (m_1)	gr	22.1
Berat Air	gr	8.3
Berat Tanah Kering (m_2)	gr	13.8
Volume Tanah Basah (V)	ml	14.0
Volume Tanah Kering (V_s)	ml	7.0
Kadar Air (W_c)	%	60.1
$SL = (W_s - ((V - V_s)/m_2)) * 100\%$	%	9.4

G. Pemadatan Standar Tanah Asli

Data :

Berat Mold = 2980 gr

Diameter = 15.5 cm

Tinggi = 11.3 cm

Water Content

Penambahan Air	ml	23%			26%			29%			32%		
		1	2	3	1	2	3	1	2	3	1	2	3
Berat Cawan	gr	8.20	8.10	7.80	7.80	8.20	8.20	7.80	8.10	8.10	8.30	8.50	7.90
Berat Tanah Basah + Cawan	gr	23.60	27.90	30.10	20.80	23.80	18.90	22.00	26.50	25.40	22.30	18.80	20.80
Berat Tanah Kering + Cawan	gr	20.70	24.00	25.90	18.10	20.60	16.80	18.80	22.50	21.60	19.10	16.40	17.60
Berat Air	gr	2.90	3.90	4.20	2.70	3.20	2.10	3.20	4.00	3.80	3.20	2.40	3.20
Berat Tanah Kering	gr	12.50	15.90	18.10	10.30	12.40	8.60	11.00	14.40	13.50	10.80	7.90	9.70
Kadar Air	%	23.20	24.53	23.20	26.21	25.81	24.42	29.09	27.78	28.15	29.63	30.38	32.99
Kadar Air Rata-rata	%	23.64			25.48			28.34			31.00		

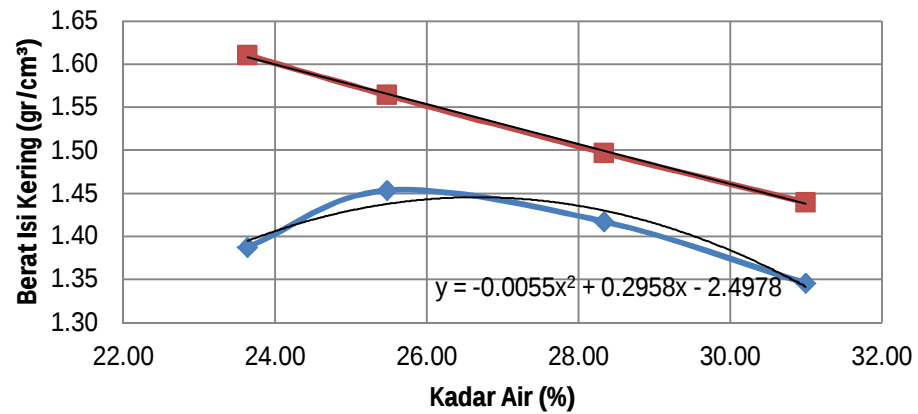
Density

Penambahan Air	ml	23%	26%	29%	32%
Berat Cetakan	gr	2980.00	2980.00	2980.00	2980.00
Berat Tanah Basah + Cetakan	gr	6640.00	6870.00	6860.00	6740.00
Berat Tanah Basah	gr	3660.00	3890.00	3880.00	3760.00
Isi Cetakan	cm ³	2133.08	2133.08	2133.08	2133.08
Berat Isi Basah	gr/cm ³	1.72	1.82	1.82	1.76
Berat Isi Kering	gr/cm ³	1.39	1.45	1.42	1.35

Zero Air Void

Penambahan Air	ml	23%	26%	29%	32%
Kadar Air	%	23.64	25.48	28.34	31.00
Gs		2.60	2.60	2.60	2.60
Berat Jenis Air	gr/cm ³	1.00	1.00	1.00	1.00
Berat Jenis Air (ZAV)	gr/cm ³	1.61	1.56	1.50	1.44

Pemadatan Tanah Asli



$$y = -0.0055x^2 + 0.2958x - 2.4978$$

$$dy/dx = -0.011x + 0.2958$$

$$x = 26.891$$

$$y_d = 1.479 \text{ gr/cm}^3$$

H. Pemadatan Standar Tanah Asli + 6% Abu Sekam + 4% Semen

Data :

mould weight = 2680 gr
 sample diameter = 15.5 cm
 sample height = 11.3 cm

Water Content

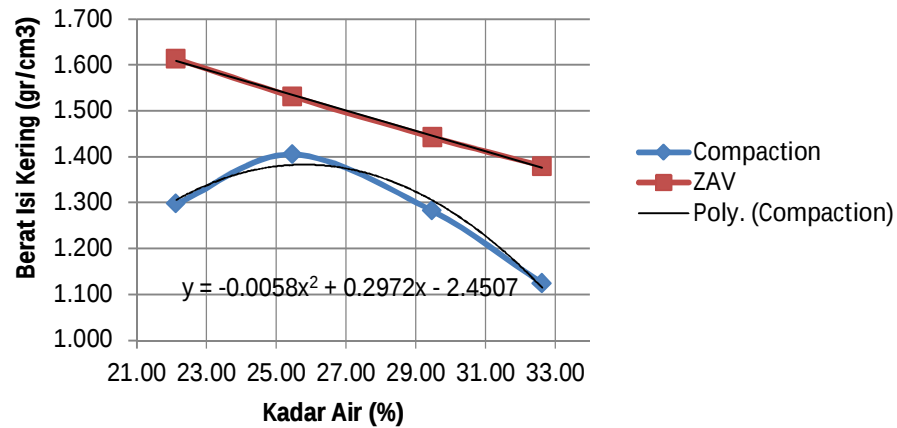
Penambahan Air	ml	22%			25%			29%			32%		
		1	2	3	1	2	3	1	2	3	1	2	3
Berat Cawan	gr	5.7	5.7	5.8	8.2	8.1	8.5	5.6	4.2	5.8	5.7	5.8	5.6
Berat Tanah Basah + Cawan	gr	18.6	23.6	19.8	39.8	45.9	27.8	24.5	18.4	20.4	25.8	20.3	21.6
Berat Tanah Kering + Cawan	gr	16.2	20.8	17	33.3	38.1	24	20.5	14.5	17.6	21.2	16.3	17.9
Berat Air	gr	2.4	2.8	2.8	6.5	7.8	3.8	4	3.9	2.8	4.6	4	3.7
Berat Tanah Kering	gr	10.5	15.1	11.2	25.1	30	15.5	14.9	10.3	11.8	15.5	10.5	12.3
Kadar Air	%	22.86	18.54	25.00	25.90	26.00	24.52	26.85	37.86	23.73	29.68	38.10	30.08
Kadar Air Rata-rata	%	22.13			25.47			29.48			32.62		

Density

Penambahan Air	ml	22%	25%	29%	32%
Berat Cetakan	gr	2680	2920	2680	2960
Berat Tanah Basah + Cetakan	gr	6060	6680	6220	6140
Berat Tanah Basah	gr	3380	3760	3540	3180
Isi Cetakan	cm3	2133.08	2133.08	2133.08	2133.08
Berat Isi Basah	gr/cm3	1.585	1.763	1.660	1.491
Berat Isi Kering	gr/cm3	1.297	1.405	1.282	1.124

Zero Air Void

Penambahan Air	ml	22	25	29	32
Kadar Air	%	22.13	25.47	29.48	32.62
Gs	gr/cm ³	2.51	2.51	2.51	2.51
Berat Jenis Air	gr/cm ³	1	1	1	1
Zero Air Void	gr/cm ³	1.614	1.531	1.443	1.380



$$y = -0.0058x^2 + 0.2972x - 2.4507$$

$$dy/dx = -0.0116x + 0.2972$$

$$x = 25.62$$

$$y_d = 1.36 \text{ gr/cm}^3$$